

Building a foundation for the future,
staying cool, and rocket science all
with the aid of high energy x-rays

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Outline

- ◆ Useful characteristics of High Energy X-rays
- ◆ Applications
 - Phase mapping in engineering materials
 - » Sulfate attack on cement
 - Atomic structural studies at high energy
 - » Not illustrated
 - Resonant scattering at very high energies
 - » Pb/Bi distribution in $\text{Pb}_5\text{Bi}_6\text{Se}_{14}$ – a candidate thermoelectric material
 - *In-situ* studies at high energy
 - » Cement hydration at high T and P
 - » Rocket science - real time erosion of rocket nozzles
- ◆ Conclusions

Useful characteristics

- ◆ Access to high Q
- ◆ Penetration of sample and sample environment
- ◆ Reduced systematic error due to good penetration
- ◆ Access to high energy absorption edges for resonant scattering studies

Conclusions

- ◆ There are many interesting and important problems in materials engineering/physics/chemistry that need or can benefit greatly from access to high fluxes of high energy x-rays
- ◆ These x-rays facilitate:
 - None destructive characterization of bulk samples
 - Resonant scattering at high energy edges
 - In-situ studies under demanding conditions
 - High accuracy crystal structure studies
- ◆ We are currently severely limited by the poor availability of high energy x-ray sources and for some experiments higher fluxes would be very beneficial
 - We need better access and optimized beam lines
- ◆ Better availability of white radiation rated beam lines would be useful

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